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SALES hereby certify that annexed is a true copy of the Provisional specification  
in connection with Application No. 2003905345 for a patent by CHOCOLATE  
GRAPHICS PTY LTD as filed on 01 October 2003.



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Twelfth day of October 2004

*J. Billingsley*

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## **PROVISIONAL SPECIFICATION**

**Invention Title: "MANUFACTURE OF MOULDS  
FOR CHOCOLATE PRODUCTS"**

**The invention is described in the following statement:**

**TITLE:** MANUFACTURE OF MOULDS FOR CHOCOLATE PRODUCTS

**BACKGROUND OF THE INVENTION**

1. **Field of the Invention**

5 THIS INVENTION relates to a method of manufacture for moulds for chocolate products.

The invention is particularly suitable for, but not limited to, the manufacture of moulds for the production of chocolate products having thin raised design(s) thereon in different colour(s) than  
10 the rest of the chocolate products.

2. **Prior Art**

International Publications WO 97/39636 (= PCT/AU97/00245) and WO 02/15707 (= PCT/AU01/01067) disclose respective methods for the manufacture of chocolate products with  
15 thin raised design(s), of at least one different colour chocolate thereon.

The manufacture of the second mould plate, the cavities in which must accurately register with the engraved designs in the first mould plate, has been difficult.

Whilst the use of polyurethane or silicone rubber for the  
20 second mould plates is known, there has been difficulty in accurate, repetitive manufacture of the second mould plates.

**SUMMARY OF THE PRESENT INVENTION**

It is an object of the present invention to provide a

method of manufacturing the mould plates to a high degree of accuracy and/or repeatability.

It is a preferred object to provide a method which is commercially economic.

5 Other preferred objects will become apparent from the following description.

In a broad aspect, the present invention resides in manufacturing a mould for chocolate products including the steps of:

10 mixing a silicone rubber compound with a hardener to form a solution;

applying a vacuum to the solution to remove at least the source of the air bubbles in the solution;

pouring the solution in a mould former and preferably allowing the solution to settle;

15 applying a clamping pressure to the mould assembly and allowing the silicone rubber to at least initially cure; and

allowing the rubber to post cure before use.

Preferably, the solution is thoroughly mixed; and preferably, a coloured hardener is used to see when mixing is  
20 complete.

When the solution is poured into the mould former, filtered dry air may be blown onto the surface to remove air bubbles on the surface and agitate and settle the solution around the shapes in

the former.

A flexible divider may be applied to the top surface of the former and rolled with a roller to work any air pockets out of the mould and cause excess solution to be excluded from the former.

5 Preferably, the initial curing is for 24 hours.

Preferably, the edges of the mould are trimmed to remove any excess rubber.

The post curing may be at room temperature, eg., for 7-10 days, in a curing oven, eg., at 200°C for approximately 2 hours.

10 BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 to 10 inclusive show the steps in making the moulds, where FIGS. 4 and 4(A) and FIGS. 5 and 5(A) illustrate respectively single and multiple mould processing steps.

15 DETAILED DESCRIPTION OF THE  
PREFERRED EMBODIMENTS

The moulding process is divided into 10 basic stages:

A - Preparation

B - Measuring

C - Mixing

20 D - Vacuuming

E - Pouring/Settling

F - Pressing/Clamping

G - Curing

H - Trimming

I - Post Curing

J - Clean Up

#### **A - PREPARATION**

5                   1.     The entire work area must be clean and dust free with stainless steel work benches.

                  2.     The former components must be thoroughly clean and dust free. *Note:* Any product that is not "food grade" shall not be used to clean, or be allowed to come into contact with any surface or  
10    items that are used with the "Elastosil M 4642 Silicone Rubber" moulding compound (hereinafter called "silicone"). All surfaces must be dry and dust free. The use of filtered dry compressed air is ideal in these circumstances as static in the former causes dust and fibres to cling to the surface.

15                   3.     Wax or Vaseline is a good release agent for other surfaces that will come into contact with the compound and will shorten clean-up times.

                  4.     Prior to commencement, all equipment and formers must be set out in the correct order.

#### 20                   **B - MEASURING (Fig. 1)**

                  The silicone rubber compound is poured into a mixing bucket in a "weight measured" amount. The correct amount required is determined by the size of the former.

*Note:* An allowance is made for a slight excess - this allows for compound that remains in the mixing bucket and on the stirrer as well as ensuring adequate mixture to fill the formers. The excess is squeezed out during clamping. A small waste will occur but is proven to be essential in forming perfect rubber moulds.

*Note:* Do not weigh a previous mould and measure out the same amount for a new one.

### C - MIXING (Fig. 1)

1. After measuring the silicone rubber compound, the hardener is added at ratio of 9% (+1%) of the "weighted" amount. (Hereinafter called "the solution"). The 1% tolerance is to allow for carry over during pouring when weighing the hardener. Too much hardener will reduce the working time of the mixed solution, and can prevent proper curing, or cause a shortfall when using the last of the silicone in the drum. Too little will also prevent proper curing.

*Note:* When mixing large quantities of the solution, it is important that approximately half the hardener is added and well mixed in before adding the remainder. This prevents too much hardener being concentrated at one time causing part of the solution to start to gel.

2. Mixing is crucial - if the solution is not thoroughly mixed, uncured areas may occur within the finished rubber mould. A coloured hardener is high preferable as it is easy to see when the

mixing process is complete. Mixing should only take about 1 minute.

Several items are highly preferable for mixing:

a) Mixing bucket - i) must be round and have a flat base; (ii) must fit the vacuum chamber; (iii) must have a pouring spout; and (iv) must be of suitable size to contain the "foaming" of the solution while vacuuming.

b) Stirrer - i) must be suitably rigid, of a metal or hard plastic type material and be able to reach into the bottom corners of the bucket.

3. Once the hardener is added, the solution has a working life of approximately "35 minutes". After this time, the solution starts to set and the removal of air bubbles and proper forming becomes difficult.

Time must be carefully considered when making varying numbers of multiple moulds. If a shortfall in the solution amount occurs, there is very likely little or no time left to mix and add more solution.

#### D. VACUUMING (Fig. 2)

Air is introduced into the compound and mixed solution during all stages, from manufacture to packaging to mixing. This must be removed as much as possible prior to pouring into the former.  
*Note:* Not all air will be removed in the time allowed - this will be addressed during the pouring/setting process.



1. Place the mixing bucket into the chamber and position the lid. It is very important that the lid is positioned accurately on the top of the chamber - if it is not and the vacuum dislodges it, the solution will be spoiled.

5           2. Start the vacuum pump and then close the inlet valve. Do not try to start the pump under load.

          3. As the vacuum increases, the solution will start to "foam" as the air is drawn out of the mixture. Manual agitation of the chamber during this period will settle the foaming and prevent  
10           overflowing of the bucket. It is important that the vacuuming process be watched in the initial stages.

          4. Vacuum for approximately 10 minutes, depending on the volume of the solution. The solution will foam and settle several times during vacuuming. Experience with use will ultimately  
15           give better control and results.

          5. Leave the pump running and close the valve from the tank to the pump. (Leave the pump running with the valve closed until the rubber moulds are poured, this vacates the pump.) Slowly open the inlet valve to the tank and allow the air to bleed back into the  
20           tank until the pressure is neutralised. This must be done slowly or the solution will become aerated and could "explode" within the chamber. The solution will settle immediately the valve is opened and all foaming or bubbles will be seen to disappear.

6. Once settled, remove the bucket from the chamber, being careful not to allow any dirt or dust, etc., to fall into the solution.

#### **E - POURING/SETTLING (Fig. 3)**

5 During the pouring, it is important to minimise the risk of introducing air back into the solution. Hold the bucket approximately 150mm from the former and slowly and smoothly pour the solution in with one unbroken motion.

10 1. Beginning with the first of the formers, and starting from any corner of the arranged shapes within the former, work in a vertical zig zag (Fig. 3, Step 1) motion across all of the shapes and gaps between the shapes until reaching the last shape. Continue back and forth until adequate solution is poured. It is important that all of the shapes are totally covered. Use a spatula to evenly distribute the  
15 solution.

2. Air bubbles will again appear on the surface of the solution. Using a low-pressure air gun (filtered dry air, not lubricated) blow across the surface of the solution whenever air bubbles are evident. This process can take several minutes for best results (Fig 3.,  
20 Step 2).

This has several effects:

- a) It will remove the air bubbles on the surface.
- b) It will agitate and settle the solution around the

shapes and bring other air bubbles to the surface.

Do not use high air pressure as it may aerate the solution or blow it out of the former.

3. Allow the solution to settle evenly across the  
5 former. Gently fold the 1mm clear polycarbonate divider (Fig. 3, Step 3) and starting from the centre of the former, roll it out toward the edges. Using a 150mm (approximately) wide roller will aid with the disbursement of the solution and work any air pockets out of the mould. The excess solution will flow out the sides of the former and  
10 should be collected and used in the following former. Locate the divider on the locating pins.

Repeat the process for the remaining formers, scraping the last of the solution out of the bucket into the last former. If measured correctly there will be minimal waste. As each former is  
15 completed, it is placed into the press, the next former is placed on top of the first until all are completed. Clamping bolt are used for alignment.

4. Scrape away any excess solution from around the formers, in preparation for pressing.

20 Some excess solution spillage is unavoidable, so care must be taken to avoid getting any onto clothes or spread around the work area.

Again, it is very important that the solution has not

begun to set before pressing.

#### **F - PRESSING/CLAMPING**

There are two methods of pressing and clamping:

1. A single mould former assembly (Fig. 4).

5                   a) Place the assembled former into a press ensuring that it is square within the press plates to obtain an even pressure (Fig. 4a).

                  b) Place a pressure board on top of the cushion board. The pressure board is the same size as the area covered by the  
10   former patterns and is used to concentrate the pressing force in this area.

                  c) Apply a steady pressure until the former is firmly clamped and large amounts of excess solution have stopped flowing (about 4000kg is sufficient force). Place 4 "G" clamps (or  
15   similar) equally around the former and firmly tighten to compensate, should the press lose pressure during curing.

                  If they are unavailable the press plates used in method 2 can be used.

2. A multiple mould former assembly (Figs. 5 and 5a).

20                   Pressing is carried out as per the first method with the exception that the formers are stacked and clamped using press plates which are clamped with bolts after pressing is complete.

                  A pressure board is only required for the top mould

as per the single mould method.

The cushion boards are of a soft material (ie., plywood or plastic), yet rigid enough to spread pressure past the pressure board to the edges of the former. This material is used to prevent fracturing of the Shenkolite formers, which may occur when placed under pressure from a metal surface. (Any slight imperfections or grit between the press plates and the Shenkolite will be absorbed by the cushion boards.)

Care must be taken to ensure the correct length press plate clamping bolts are ready for clamping (dependent on the number of formers used).

#### **G - CURING**

1. The initial curing process takes 24 hours before clamping pressure can be released from the former(s), and the former(s) removed from the press or press plates.

2. Peel away any excess cured rubber from around the former(s) and remove the top.

3. Carefully peel the divider off the rubber mould starting at one corner and working diagonally across the rubber mould (Fig. 6).

The rubber mould cannot be removed from the former until initial trimming has been done around the top of the former shapes (see "Trimming").

By utilising the press plates, the mould assembly can be removed from the press when clamped and further moulding can continue, using the same press, and additional press plates and formers.

5

#### H - TRIMMING

1. A flat bladed modelling knife or safety edged razor blade is used to gently peel away excess cured rubber from the tops of the former shapes before removing from the former. Care must be taken to avoid marking the new rubber mould or the former, or  
10 scraping away the former shape material (Fig. 7).

2. Use the knife to run around the sides of the rubber mould to release it from the former and trim the edges. Again, being careful not to cut into either the rubber mould or the former (Fig. 8).

3. A small pair of surgical curved scissors with the  
15 sharp points rounded off is ideal for trimming all edges of the rubber mould where necessary. (Although expensive, surgical grades have a better edge, last longer and have closer tolerances for this work) (Fig. 9).

Trimming takes some practice and good tools to minimise  
20 the risk of accidental rubber mould damage, but having said that, it is not a difficult process.

Once the curing and trimming processes are completed, post curing must be carried out before the rubber mould is suitable for

use. There are two methods to achieve this:

1. The rubber mould should sit for at least 7 days before use, longer if the weather is cold. Paper dividers must be placed under and between all of the new rubber moulds to prevent marking.

OR:

2. Place the rubber mould(s) in an oven at 200°C for two hours. The rubber mould(s) must be on a clean surface during this time. A layer of aluminium foil is preferable under the mould to prevent contact with the metal surface (Fig. 10).

This process is essential to remove any carcinogens from the rubber.

After completion of the moulding process, cleaning of the bucket, mixers, press and work area is best done after 24 hours when the solution has cured. At this time, the cured material will simply peel off.

Any cleaning of formers is done with dry clean cloths or food grade detergents with thorough rinsing and drying.

No solvents should be used within the moulding area. Any such materials can contaminate the rubber mould and risk contamination of the chocolate.

Various changes and modifications may be made to the embodiments described and illustrated without departing from the

present invention. For example, the hardener percentage and curing times will depend on the specific silicone rubber compound used - it must be of a suitable food grade.

5 DATED this first day of October 2003.

CHOCOLATE GRAPHICS PTY LTD

By its Patent Attorneys

FISHER ADAMS KELLY



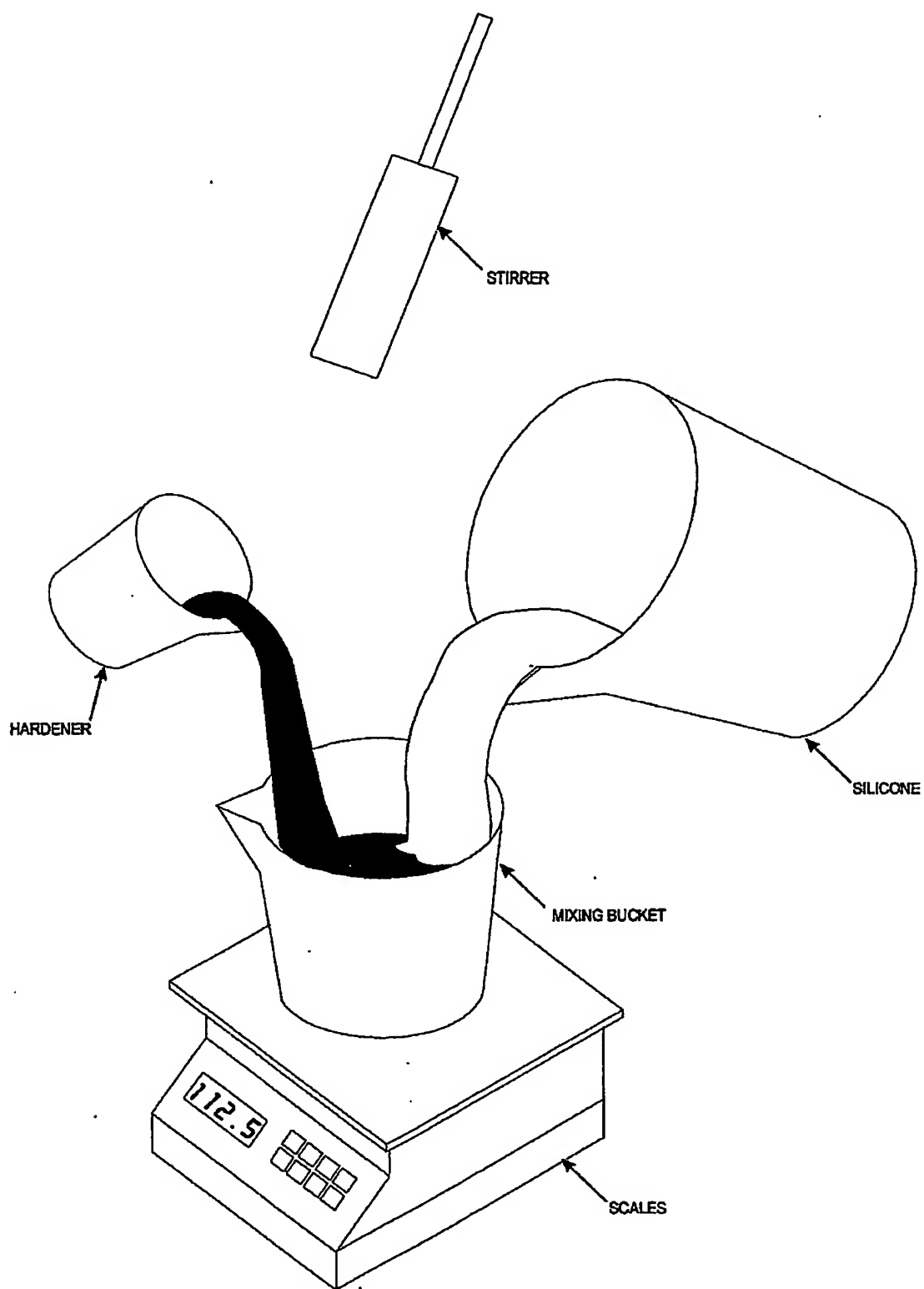


FIGURE 1

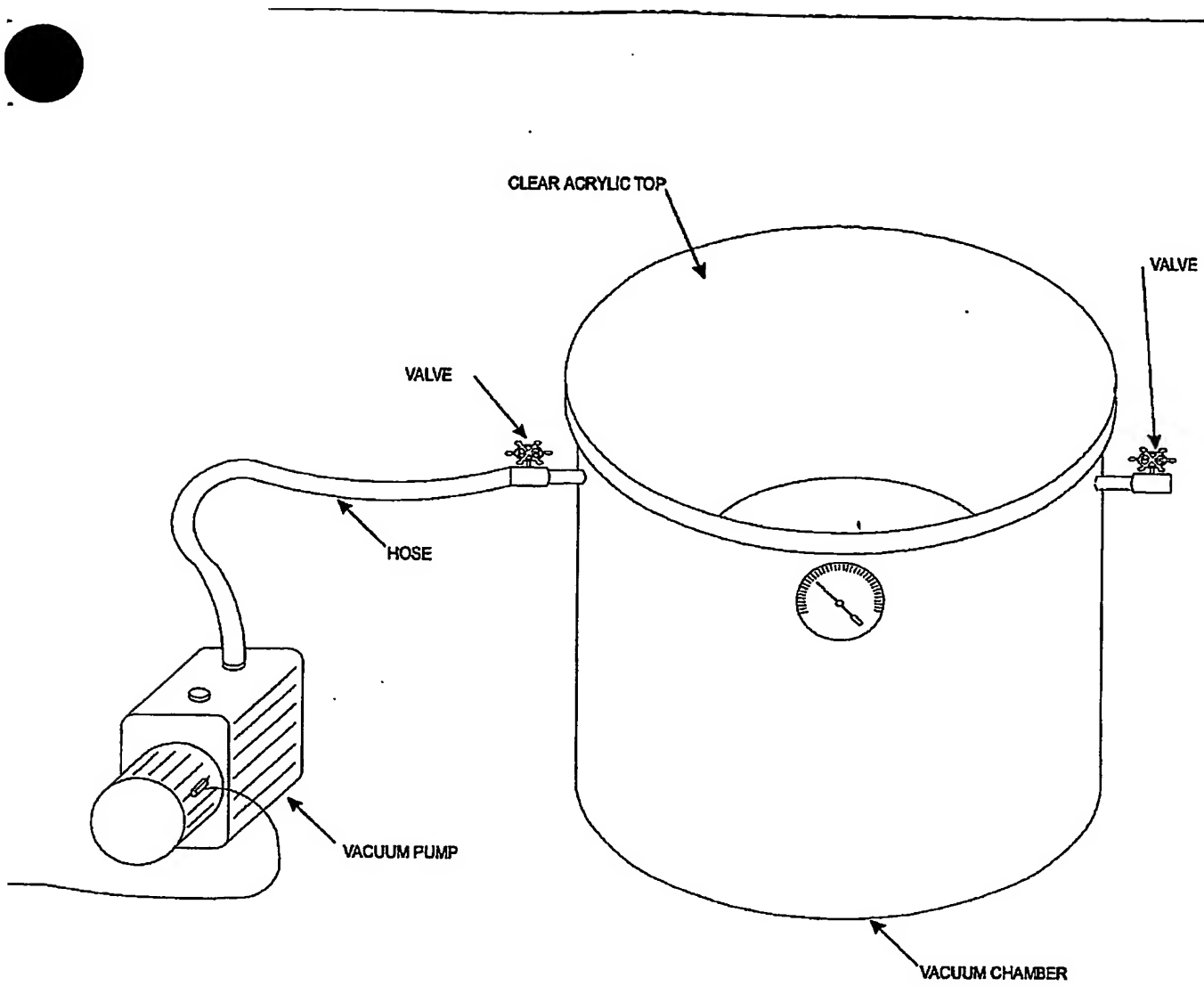


FIGURE 2

# POURING THE SILICONE RUBBER

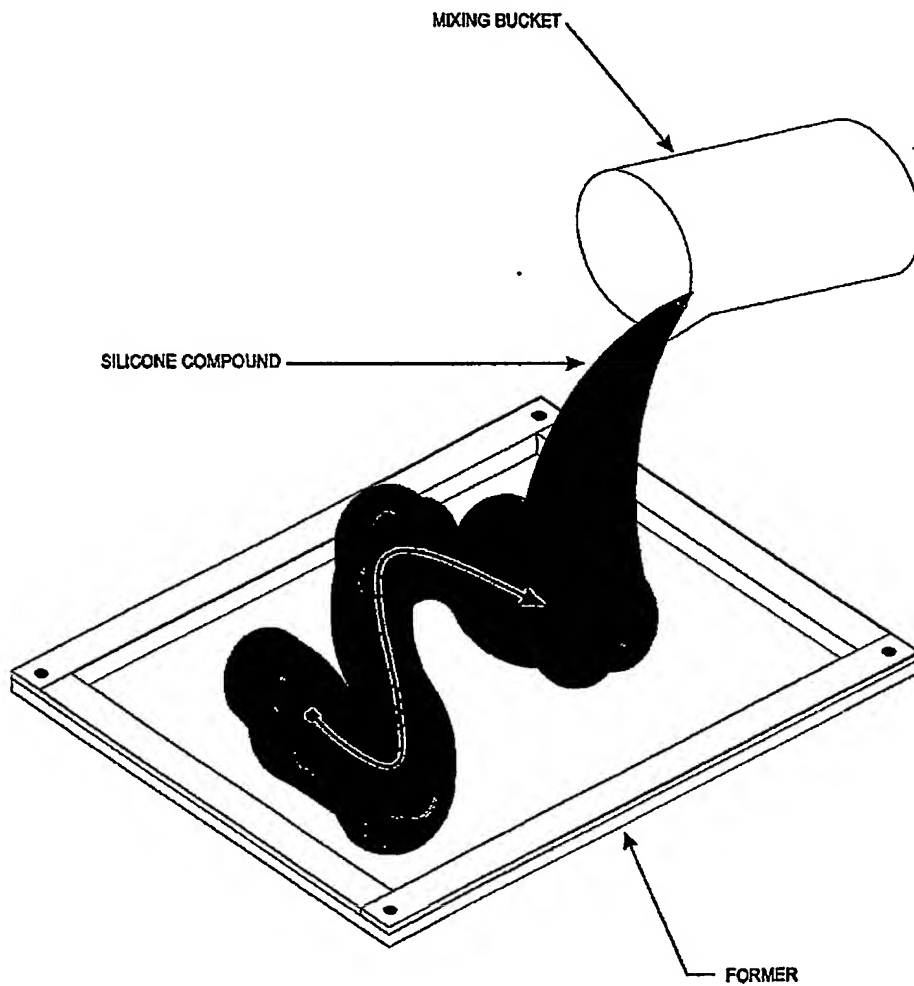


FIGURE 3 - STEP 1

# SETTLING THE SILICONE RUBBER

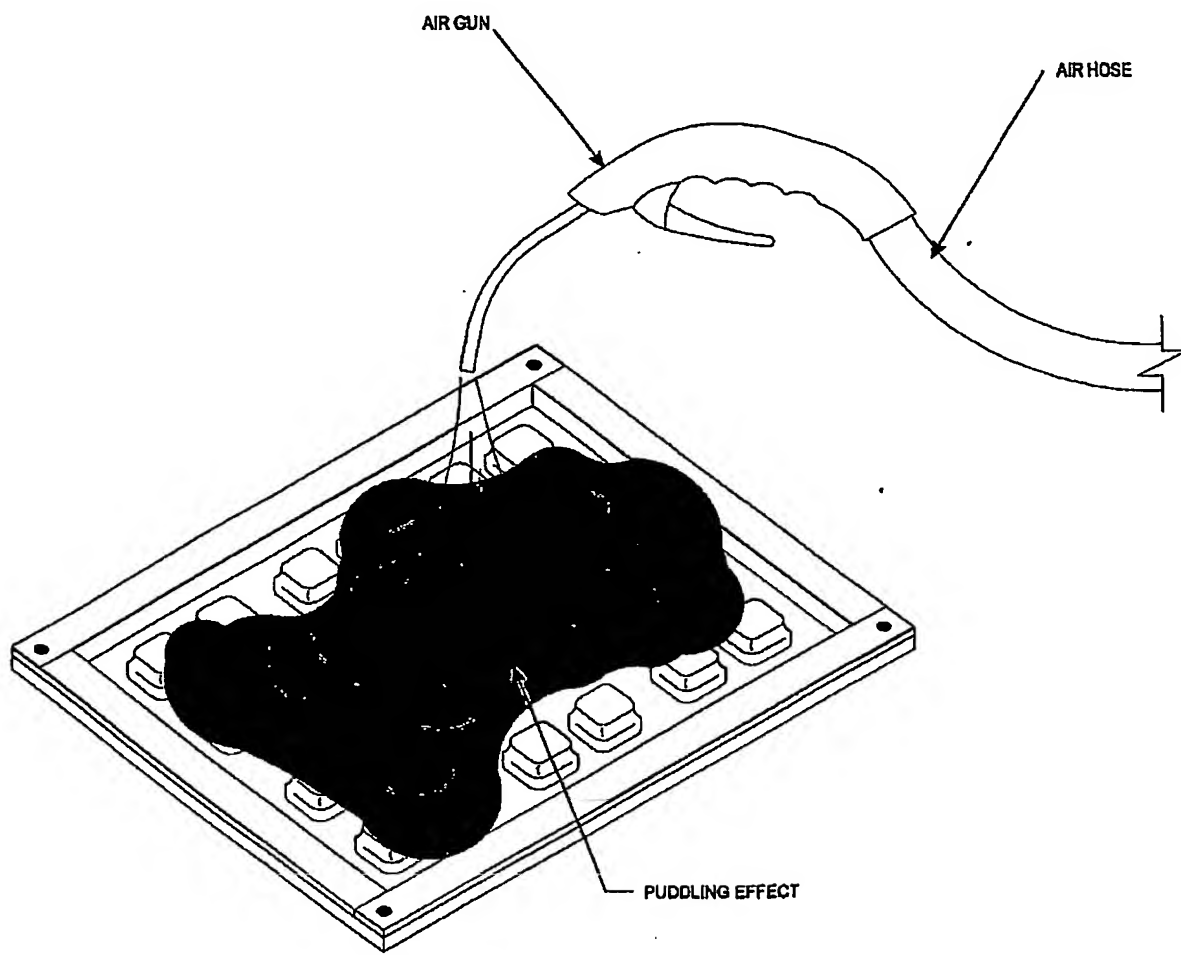


FIGURE 3 - STEP 2

# SETTLING THE SILICONE RUBBER

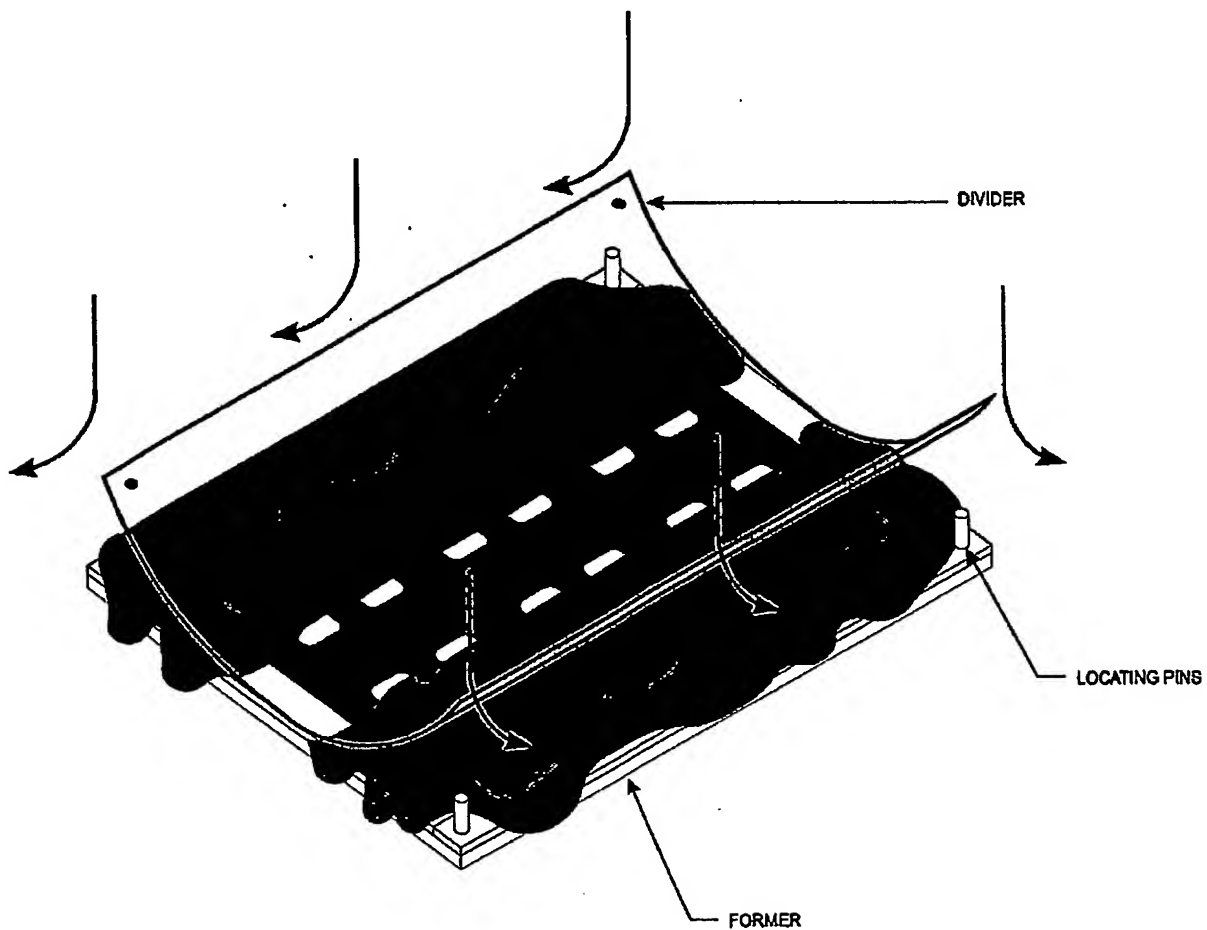


FIGURE 3 - STEP 3

# SINGLE MOULD FORMER ASSEMBLY

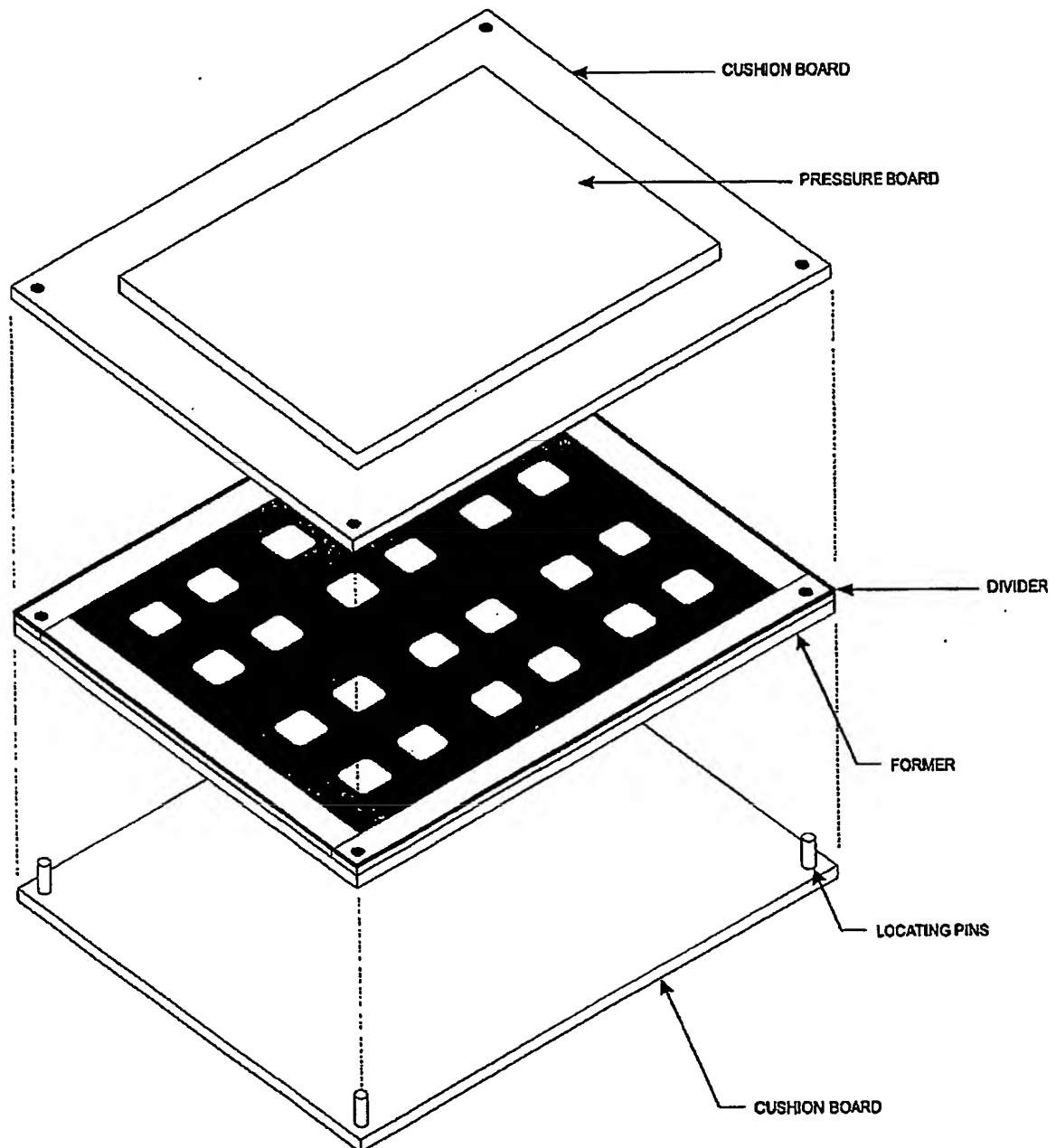


FIGURE 4

# SINGLE MOULD PRESSING

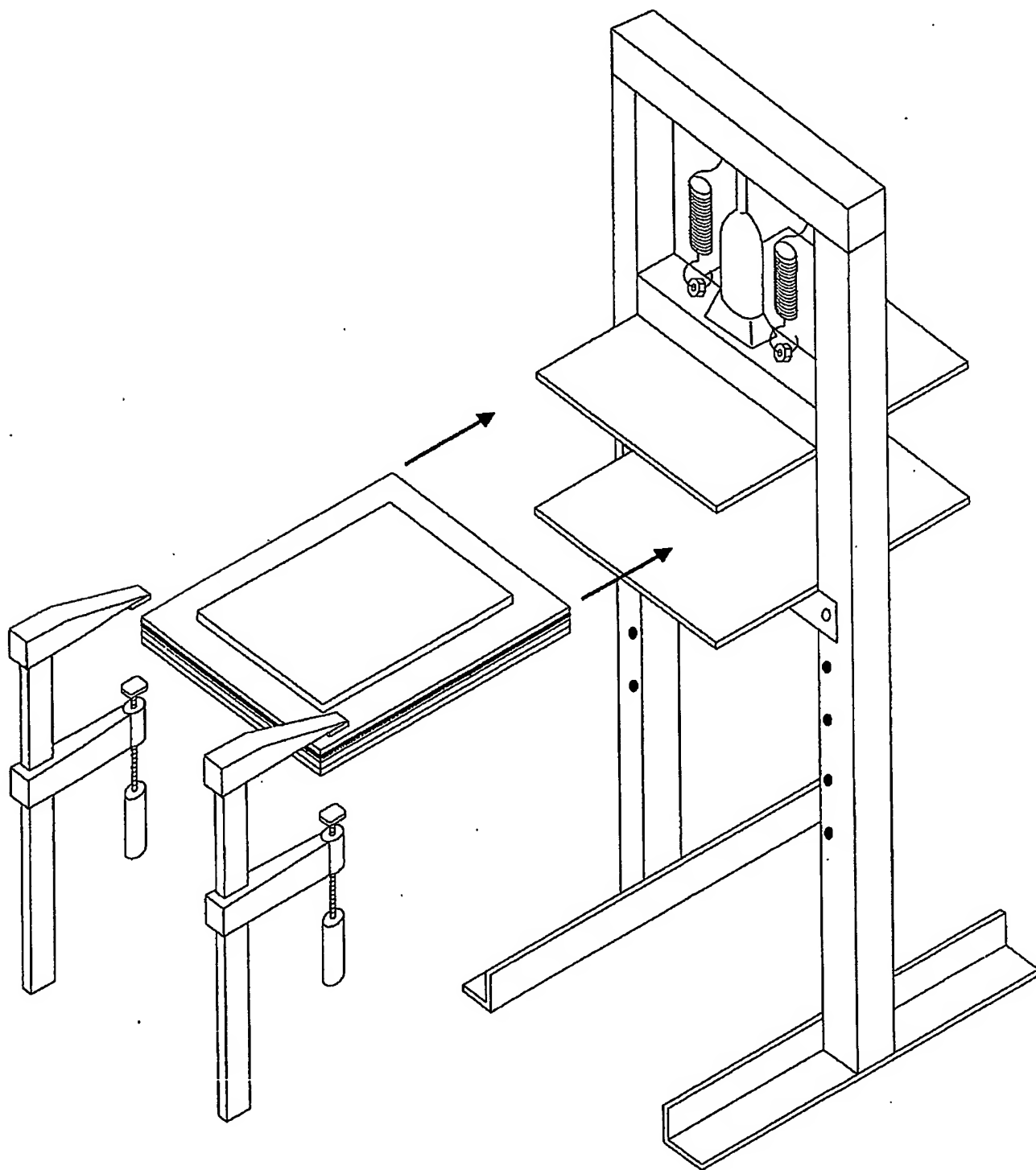


FIGURE 4(A)

# MULTIPLE MOULD FORMER ASSEMBLY

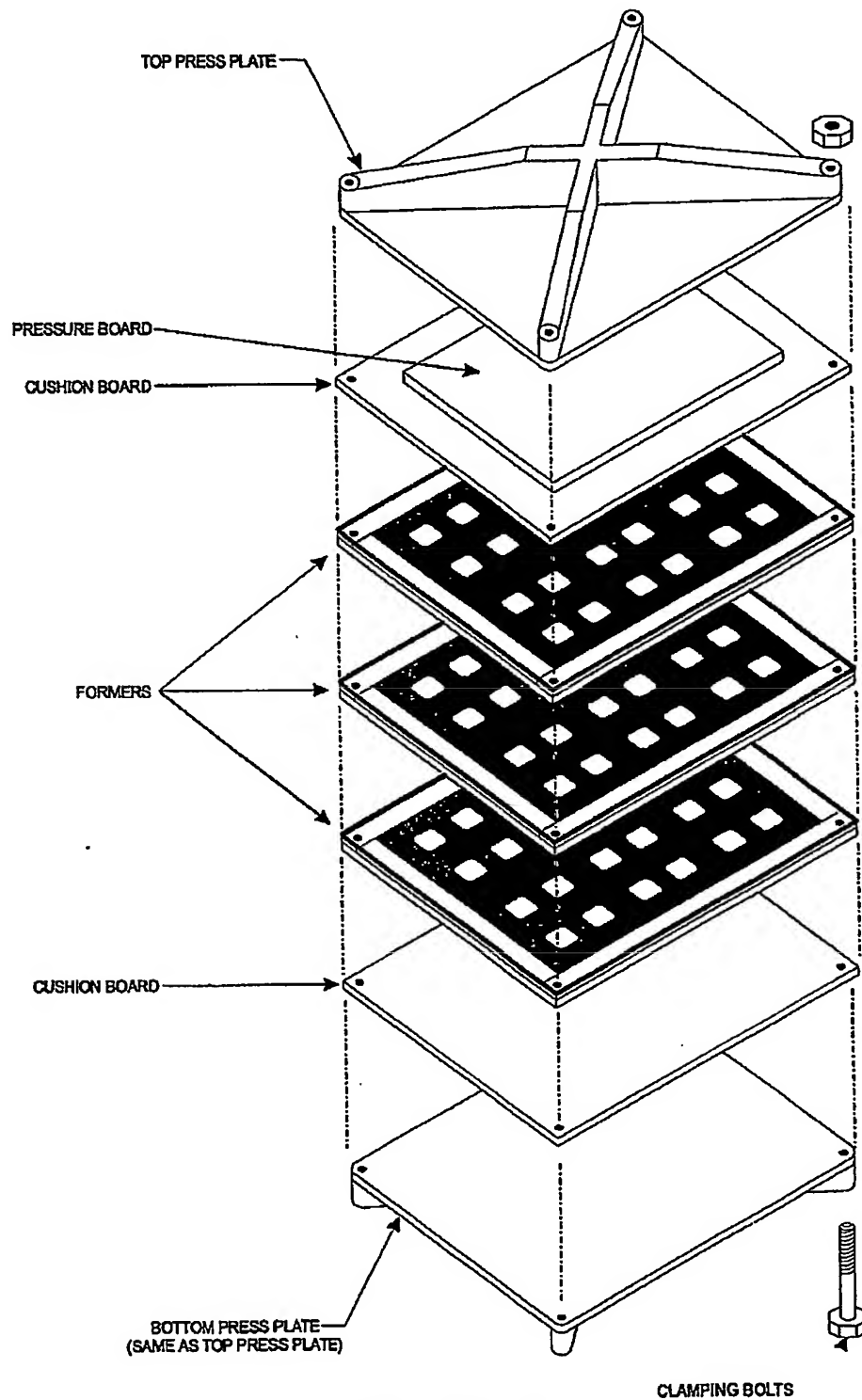


FIGURE 5



# MULTIPLE MOULD PRESSING

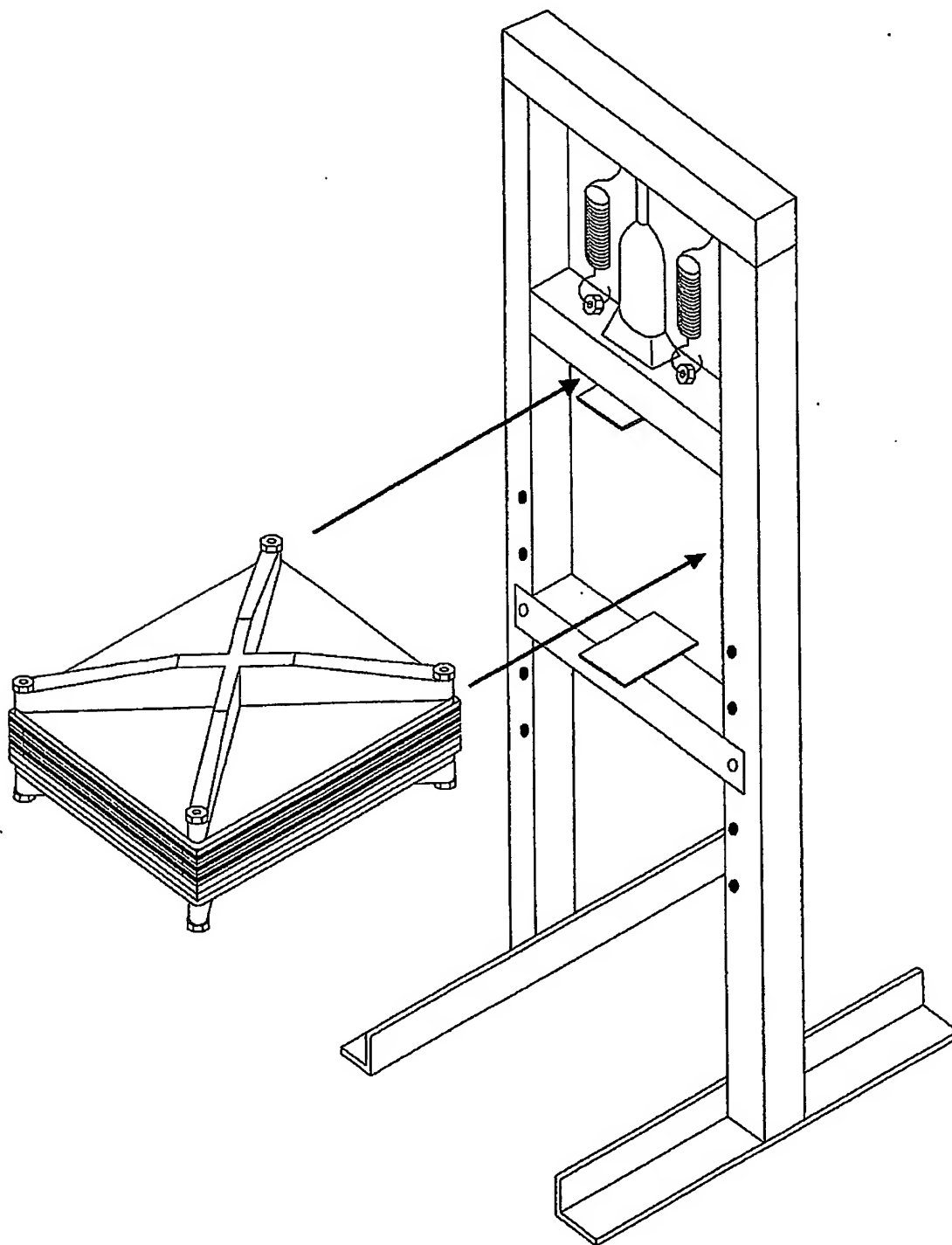


FIGURE 5(A)

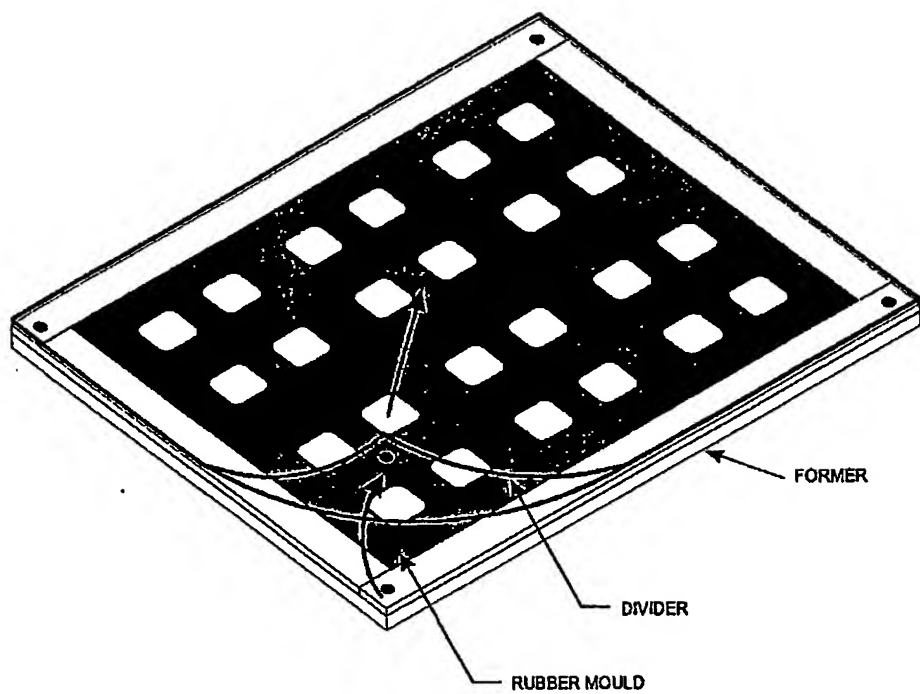


FIGURE 6

## TRIMMING

FIGURE 7

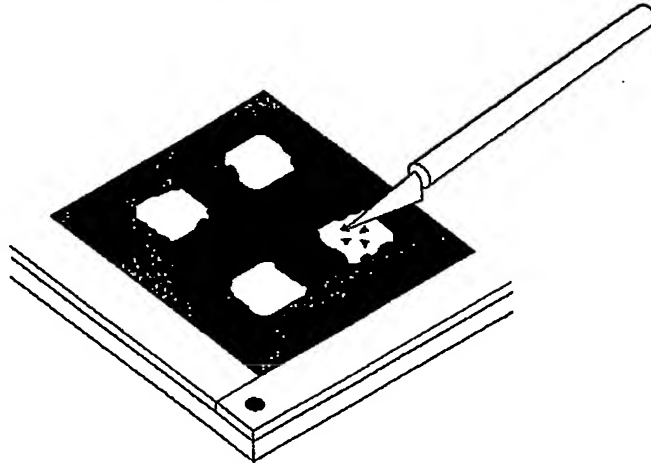


FIGURE 8

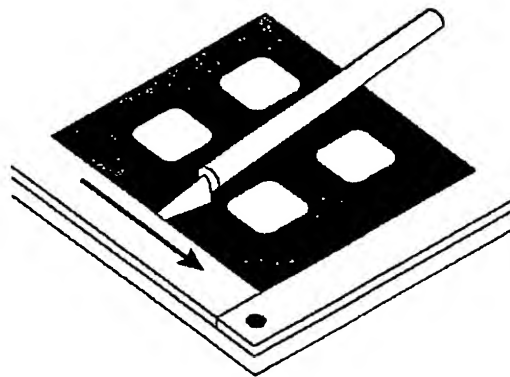
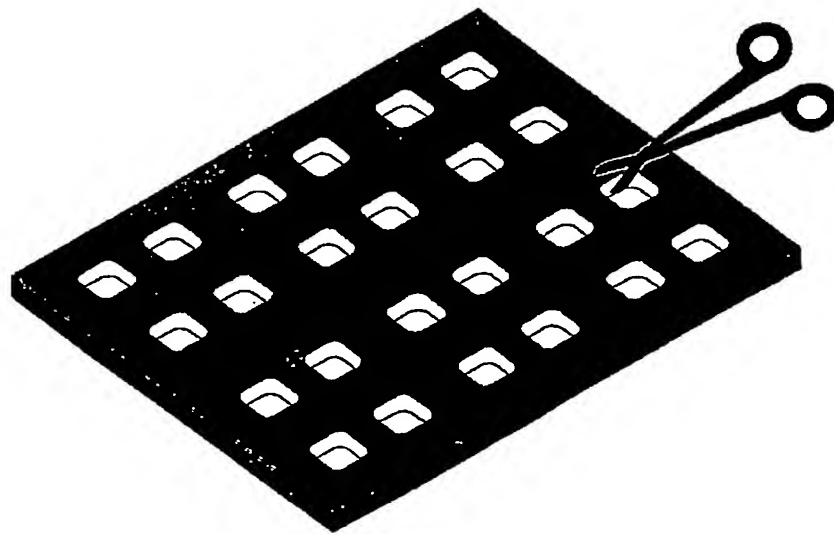


FIGURE 9



# CURING OVEN

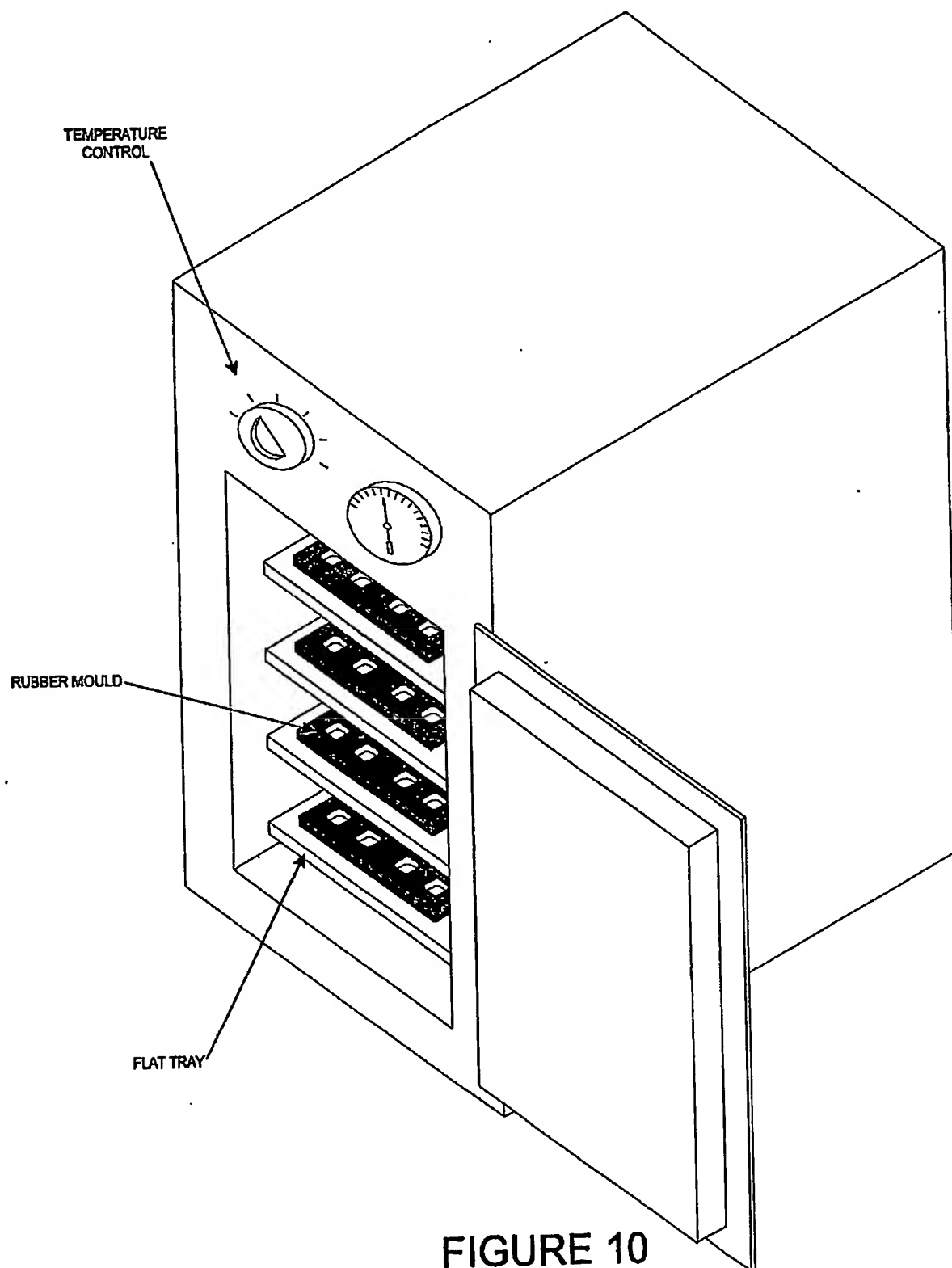


FIGURE 10

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